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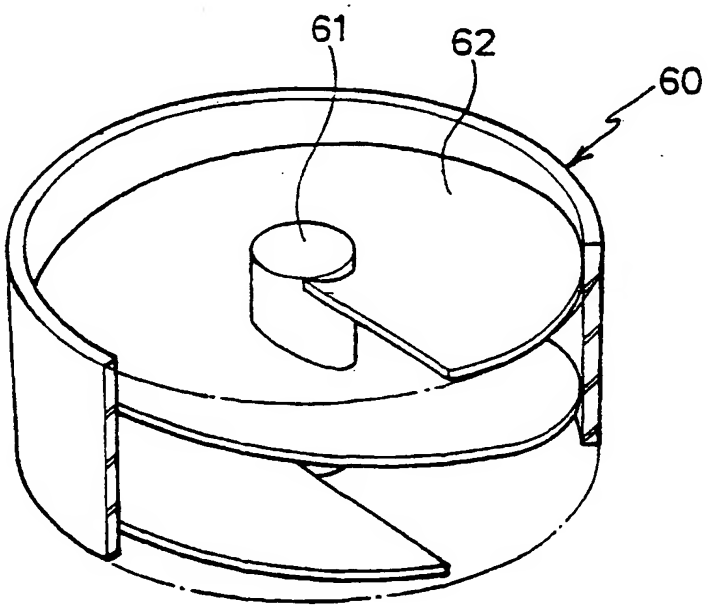
(54) Title: CYCLONE DUST COLLECTOR



(57) Abstract: A cyclone dust collector is disclosed, which prevents refly of dusts collected in a dust collecting box to a cyclone body from occurring. The cyclone dust collector comprises a cyclone body (10), a suction flow passage pipe (20) for sucking air and contaminants to the cyclone body (10), an air discharge pipe (30) for discharging the air cleaned in the cyclone body (10) to outside, a dust collecting box (50) for collecting the dusts drawn into the cyclone body (10), and a contaminant guiding means (60) being provided between the cyclone body (10) and the dust collecting box (50), wherein the contaminants drawn into the cyclone body (10) are guided to inside of the dust collecting box (50) by the contaminant guiding means (60).

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CYCLONE DUST COLLECTOR

Technical Field

The present invention relates to a cyclone dust collector, more particularly, to a cyclone dust collector for collecting contaminants such as dust using a cyclone principle, and more particularly, to an air flow structure inside a cyclone.

Background Art

Generally, a cyclone dust collector separates contaminants which are circulating with air, to discharge only the air to outside and collect the contaminants, by using a centrifugal force. The cyclone collector is used in different fields, and used as a vacuum cleaner, domestically.

U. S. Patent No. 5137554 discloses a helical projection formed at a cone part of a cyclone collector. The helical projection is formed for efficient falling of particles such as dusts having a circulating force.

Additionally, U. S. Patent No. 3870486, No. 4853008, No. 4373228, No. 4643738, No. 4593429, No. 5080697, No. 5135553, and No. 5160356 discloses a cyclone dust collector of a vacuum cleaner having opposite flow direction of air. The aforementioned cyclone dust collector is provided with a cyclone body of a cone shape, and a dust collecting box at a lower part of the cone-shaped cyclone body. In the aforementioned cyclone dust

collector, air is drawn in a tangential direction of the cyclone body.

A related art cyclone structure will be explained in detail with reference to Figs. 1 and 2.

The cyclone dust collector includes a cyclone body 10 of a substantially cylindrical shape, and a suction flow passage pipe 20 formed at a predetermined portion of an upper part in a circumference of the cyclone body 10, for suction of air and contaminants (dusts, naps, papers, etc.) in a tangential direction. Additionally, an air discharge pipe 30 of a cylindrical shape is provided inside the cyclone body 10 for discharging the sucked air. The air discharge pipe 30 stands vertically, whose upper part penetrates the upper part of the cyclone body 10.

The air discharge pipe 30 is connected with a suction force generating means (not shown) which decompresses the inside of the cyclone body 10, for suction of the polluted air through the suction flow passage pipe 20. An explanation and a drawing thereof will be omitted since the means, which generates a suction force by using the suction force of a fan in accordance with a driving of a motor, is known widely.

A contaminant discharge hole 40 is formed at an end of the cone-shaped cyclone body 10 for discharging the contaminants, and a dust collecting box connected to the contaminant discharge hole 40 is formed at a lower part of the cyclone body 10.

The operation of the aforementioned cyclone dust collector will be explained in detail.

If a suction force is generated through the air discharge pipe 30 of the cyclone body 10, air containing dusts is drawn into the cyclone body 10 through the suction flow passage pipe 20 of the cyclone body 10 in the tangential direction. The air is circulated and then descended along a cylindrical inside wall of the cyclone body 10. At this instance, different centrifugal forces are applied to the air and the contaminants respectively, because of the difference in weight between the air and the contaminants.

Accordingly, the dusts are circulated along the inside wall of the cyclone body by the centrifugal force, and are discharged to the dust collecting box 50 through the contaminant discharge hole 40 with their own weights. The air which has substantially no weight is ascended by the suction force generated at the air discharge pipe 30 after bumping against a lower surface of the cyclone body 10, and is discharged to outside of the cyclone body 10.

The dusts are discharged along the inside wall of the cyclone body 10 through the contaminant discharge hole 40 by the centrifugal force, because they are comparatively heavy. That is, while the air having a weight close to 0 in accordance with the equation $F=m\ r\ \omega^2$ (where, F is a centrifugal force, m is a weight, r is a distance from a center of the cyclone body to the

inside wall of the cyclone body, and ω is an angular acceleration) generates almost no centrifugal force, the dusts having a predetermined weight are affected by the centrifugal force and as a result, they are circulated along the inside wall of the cyclone body.

Meanwhile, when the dusts are collected into the dust collecting box 50 through the contaminant discharge hole 40, circulating inside the cyclone body 10, a part of the air enters the dust collecting box 50 together with the dusts.

The air drawn into the dust collecting box 50 keeps circulating inside the dust collecting box 50, because a circulating force generated when the air is initially drawn into the dust collecting box 50 still exists. Thereafter, the air forms a secondary ascending air current within the dust collecting box 50, by a strong suction force through the air discharge pipe 30.

Accordingly, the related art cyclone dust collector has a problem in that, the dusts collected at the dust collecting box 50 are drawn out to the cyclone body 10 again through the contaminant discharge hole 40, because the dusts are re-flown by the air circulating in the dust collecting box 50.

That is, while comparatively heavy dust particles remain at the lower part of the dust collecting box 50, papers or fine dusts having substantially no weight are drawn back to the cyclone body 10 by the ascending air current in the dust

collecting box 50.

At the same time, the circulating air flow which is descended along the inside wall of the cyclone body 10 is discharged with the secondary ascending current from the dust collecting box 50. Accordingly, the fine dusts contained in the circulating air which are comparatively light keep circulating inside the dust collecting box 50, by the circulating force of the air in the dust collecting box 50. As a result, a static electricity is generated in the dust collecting box 50, which causes a serious pollution inside of the dust collecting box 50 and makes cleaning inside the dust collecting box difficult.

Disclosure of Invention

Accordingly, the present invention is directed to a cyclone dust collector that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

An object of the present invention is to provide a cyclone dust collector which can prevent an ascending air current generated by a suction force from flowing into the dust collecting box, for preventing re-fly of dusts collected in a dust collecting box to a cyclone body from occurring.

Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the

invention will be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, the cyclone dust collector of the present invention comprises a suction flow passage pipe for sucking air and contaminants into the cyclone body, an air discharge pipe for discharging the air cleaned inside the cyclone body to outside, a dust collecting box for collecting the dusts drawn into the cyclone body, and a contaminant guiding means being provided between the cyclone body and the dust collecting box, for guiding the contaminants sucked into the cyclone body to inside of the dust collecting box.

The contaminant guiding means is preferably provided with an axis at a center inside the cyclone body, and a wing extended in a helical shape between the inside wall of the cyclone body and the axis. Additionally, the contaminant guiding means is preferably formed integrally as a helical flow passage guide, along the cyclone body.

In accordance with the present invention, a dust collecting efficiency can be improved, and a re-fly and a circulating air flow inside the dust collecting box can be prevented.

Brief Description of Drawings

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention, wherein:

Fig. 1 is a vertical sectional view showing a related art cyclone dust collector;

Fig. 2 is a sectional view by I-I line of Fig. 1;

Fig. 3 is a vertical sectional view showing a cyclone dust collector in accordance with the present invention;

Fig. 4 is a perspective view showing a contaminant guiding means of a cyclone dust collector in accordance with the present invention; and

Fig. 5 is a perspective view showing another embodiment of the contaminant guiding means in accordance with the present invention.

Best Mode for Carrying Out the Invention

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

Fig. 3 illustrates a section of the cyclone dust collector in accordance with the present invention, and Fig. 4 illustrates a contaminant guiding means of the cyclone dust collector in accordance with the present invention. The cyclone dust collector

in accordance with the present invention will be explained in detail with reference to the aforementioned drawings.

The present invention includes a contaminant guiding means 60 between a cyclone body 10 and a dust collecting box 50, for guiding contaminants sucked to inside of the cyclone body 10 to inside of the dust collecting box 50. The contaminant guiding means is preferably provided with a helical wing 62 integrally formed along an axis 61. The cyclone body 10 and the dust collecting box 50 are connected to each other by a continuous air flow passage formed therebetween by the helical wing, and an air flow circulating within the dust collecting box 50 and the suction force of the air discharge pipe 30 can be efficiently blocked.

The operation of the present invention in accordance with the aforementioned structure will be explained in detail.

First, when the cyclone dust collector is put into operation, a suction force generating means (not shown) generates a suction force at one part of the cyclone body 10, that is, through an air discharge pipe 30. Accordingly, the air containing dusts is sucked through a suction flow passage pipe 20 of the cyclone body 10 in a tangential direction, by the suction force generated at the suction force generating means. Then, the air containing dusts is descended, circulating along the inside wall of the cyclone body 10, because the dusts contained in the air become to have a centrifugal force because of its weight.

At this instance, the dusts are drawn into the dust collecting box 50 with a guide of the helical wing 62 with their weights and a fine air flow, because the contaminant guiding means 60 is provided at an inlet side of dust collecting box 50. While the dusts are collected to the dust collecting box 50 only with their own weights in the related art, the dusts become to have an additional air flow force in the flow passage in the present invention. Accordingly, the cyclone dust collector in accordance with the present invention has a substantially improved dust collecting efficiency.

Moreover, the flow of the air and dusts drawn into the dust collecting box 50 with the guide of the helical wing 62 is rapidly decreased as they pass through the flow passage formed by the helical wing 62. As a result, a circulating flow of the contaminants does not occur in the dust collecting box 50, thereby preventing a static electricity from generating. This is because, even though a direction of the flow passage of the contaminant guiding means 60 is same as that of the air drawn into the cyclone body 10, a long flow passage is formed to give a resistance to the air flow.

Additionally, the suction force generated at the air discharge pipe 30 does not affect the dust collecting box 50, because the cyclone body 10 and the dust collecting box 50 are separated from each other by the contaminant guiding means 60. Accordingly, the collected dusts are not re-flown because the

secondary ascending air flow is prevented from occurring within the dust collecting box 50. In addition, since the secondary ascending flow is not generated, the contaminants circulating along the inside wall of the cyclone body 10 are not drawn out through the air discharge pipe 30.

The contaminant guiding means 60 in accordance with the present invention is not limited to the aforementioned shape, that is, a shape having an axis 61 and a helical guiding wing 62. In other words, it can be understood from Fig. 5 that the same operation and efficiency as the aforementioned contaminant guiding means 60 can be obtained with a helical flow passage guide 70 formed along the inside wall of the cyclone body 10 between the cyclone body 10 and the dust collecting box 50.

Additionally, the aforementioned dust collecting box 50 is not limited to a shape that the cyclone body 10 and the dust collecting box 50 are separately provided, but can be applied to various forms of cyclone dust collectors.

It will be apparent to those skilled in the art that various modifications and variations can be made in the cyclone dust collector of the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Industrial Applicability

As aforementioned, since the present invention includes the contaminant guiding means between the cyclone body and the dust collecting box, a dust collecting efficiency can be improved by a flow within the contaminant guiding means. Additionally, a flow of the air and the dusts drawn into the dust collecting box is rapidly decreased, and a flow and re-fly of the dusts within the dust collecting box can be prevented.

Furthermore, the present invention is advantageous in that the contaminant guiding means is simply formed at the inlet side of the dust collecting box, thereby making the manufacturing procedure simple.

What is claimed is:

1. A cyclone dust collector comprising:

a cyclone body;

a suction flow passage pipe for sucking air and contaminants to the cyclone body;

an air discharge pipe for discharging the air cleaned in the cyclone body to outside;

a dust collecting box for collecting the dusts drawn into the cyclone body; and

a contaminant guiding means being provided between the cyclone body and the dust collecting box, wherein the contaminants drawn into the cyclone body are guided to inside of the dust collecting box by the contaminant guiding means.

2. The cyclone dust collector as claimed in claim 1, wherein the contaminant guiding means includes an axis located at a center inside the cyclone body, and a wing extending in a helical shape between an inside wall of the cyclone body and the axis.

3. The cyclone dust collector as claimed in claim 1, wherein the contaminant guiding means is formed integrally as a helical flow passage guide along the cyclone body.

FIG. 1

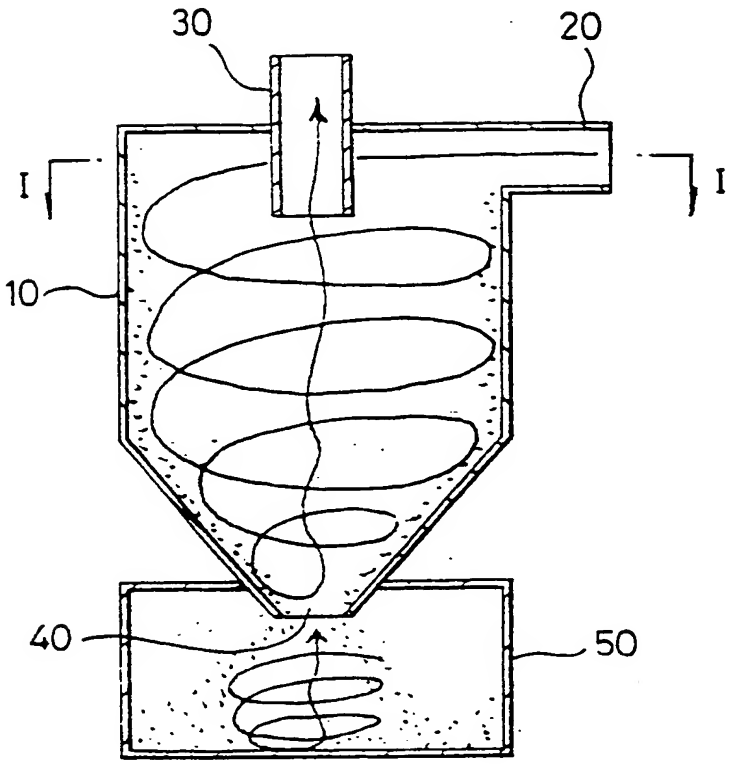


FIG. 2

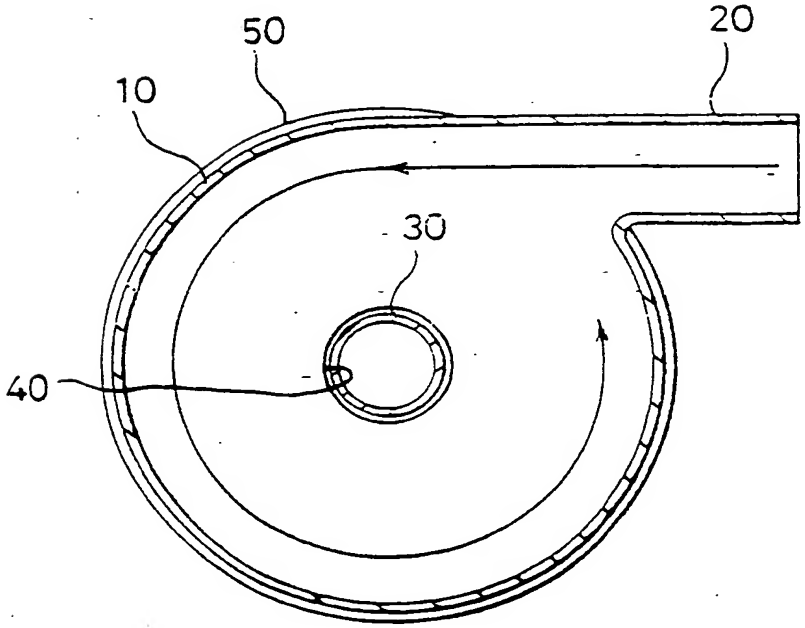


FIG. 3

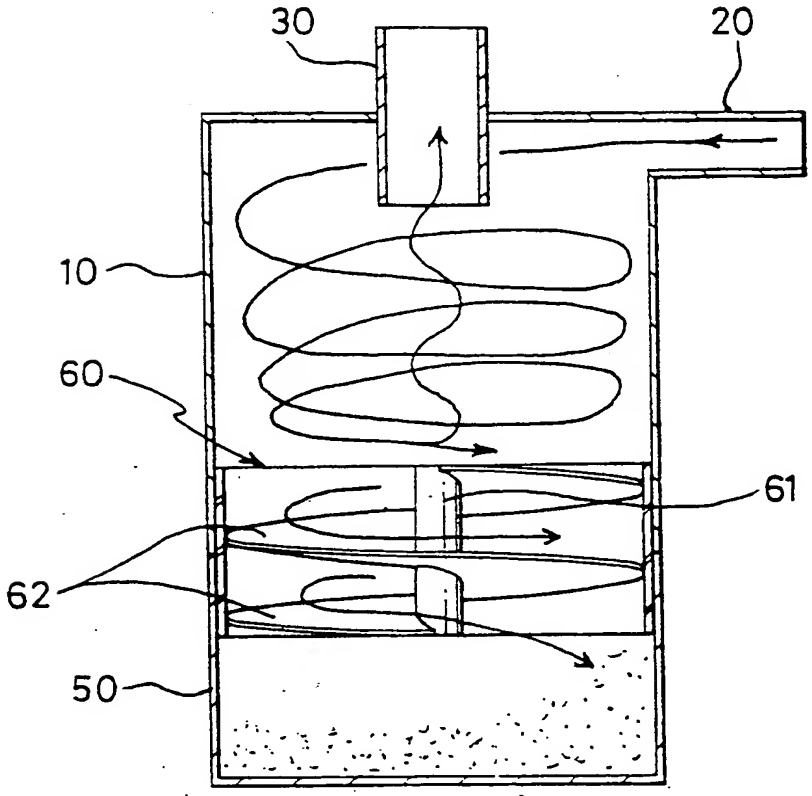


FIG. 4

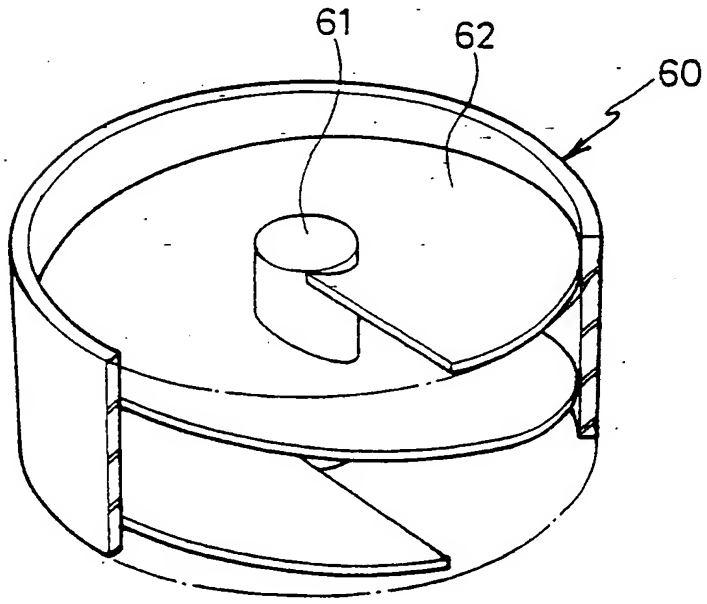
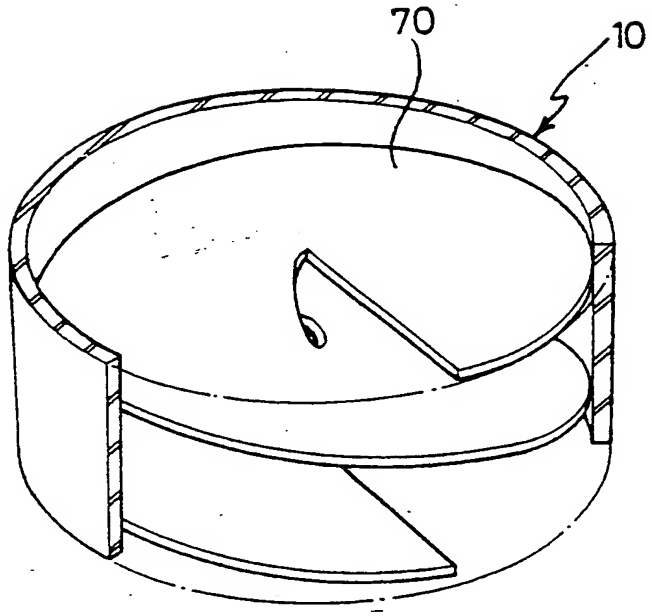


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR00/00212

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 A47L 9/16, B04C 5/103, B01D 45/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimun documentation searched (classification system followed by classification symbols)

IPC7 A47L 9/16, B04C 5/103, B01D 45/12

Documentation searched other than minimun documentation to the extent that such documents are included in the fileds searched

KR IPC as above
JP IPC as above

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search trerms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP, A, 02-078455 (SAIKURO FUIRU) 19 March 1990 (19. 03. 90) see Fig. 1, 2	1, 2, 3. (Family none)
A	US, A, 5062870 (NOTETRY LTD.) 5 November 1991 (05. 11. 91) see Fig. 1, 2, 3.	1, 2, 3. (Family none)
A	EP, A, 489468 (PHILIPS NV.) 10 June 1992 (10. 06. 92) see Fig. 1.	1. (Family none)

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevence
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